



BIOCHARPROJECT
SPREADING THE WORD ABOUT BIOCHAR

Moxham Biochar Kiln User Guide

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1 The Moxham, what why when where etc.

On 27th August 2009 a great man in biochar died. Geoff Moxham was killed in the forest getting wood for a Kiln of his design.

He was my mentor, his ideal I still carry, his passion is also mine, the legacy is alive and thriving and the name lest we forget is now shared by the lowest tech/highest yielding farm/village scale biochar unit. Simplicity in all its splendour I introduce to you the Moxham biochar concept.



His enthusiasm led me into the biochar world and with this I return the favour. All he wanted was for everyone on the planet to make biochar, put it in the soil and help save the planet.

You can check him out here www.bodgershovel.com

The Moxham units currently reside at Biochar Industries Kunghur come check them out. <http://biocharindustries.com>



2 The vessel

The Moxham is just a piece of pipe. Materially speaking it is simply a large pipe that is set on its end and a fire lit inside it.

However it gets its Spirit from the many long hours of research that Charmaster Dolph Cooke (Me) and the Barefoot Biochar Crew have invested to make the world's easiest biochar unit.



I have many people to thank who have helped me get to this point with biochar. They know who they are and for now I will just call them the barefoot biochar crew, lots of Love to all of you

The pipe I have is 1.90cm outside diameter, the section stands 170cm tall and the walls of the pipe are 20mm thick.

It is made out of steel in fact it was a reused piece of gas pipe.

It came to me by way of a friend who saw it in the scrap metal yard and immediately thought of my biochar project. He swapped it for a truck load of old scrap I had around the farm that was only rusting away. I was told it weighs 1.1 tonne and would of cost \$800.00 if he had paid cash.

Our ethos is to apply biochar freely to the planet and enthusiaste others to do the same. So everything we do / make / test /trial etc. we do openly for everyone or as Geoff Moxham would say copyleft.

We are resilient and have the balls to do what others dare not.

3 The technical aspects

How does it work?

The Moxham sits flush on a patch of ground that is far enough away from fuels and other dangers as not to be a problem. If it has any air gaps between the bottom of the pipe and the ground we simply fill them in with the dirt around the pipe.

The feedstock we use is a variety of hardwood scrap from the onsite sawmill, as well as small trees that are thinned from the plantation. This is stockpiled in the days before the Moxham is lit for a smooth continuous burn. We load the Moxham up with a variety of feedstock and a small kindling pile in the middle. Light up a cardboard box and place it in the middle and allow it to ignite.

Once the fire is well ablaze we start to add in more feedstock, being careful not to smother the flames. We continuously add feed stock to the fire and use the quality of smoke the fire gives off as a guide. We also try to keep the load evenly building up.

The fire at the bottom heats the wood and removes all moisture. The continued heat drives out and up all the volatiles which can

either combust on impact with the pyrolysis front (Flame Wall) or escape the flames only to ignite when mixed with the incoming oxygen from the atmosphere.

The layers of char cannot break down any further and because the oxygen is excluded from the char by the flames a layer of char gradually builds up until the whole Moxham is full of Biochar.

At this point we cool down the unit with water sprayed lightly on the top coals which signify they are ready to be cooled off when an absence of flame is observed. This means there is no volatiles left to drive the flames and the char is well done.



4 The operating procedures in pictures

Start with sand hilled up around the base



Load her up



Drop in a flaming cardboard box to ignite



Continue to load her up as she gets hungry



Watch out for air gaps around the base of the kiln



Once she is full and the Flames have vanished put her out



5 *Observation*

A small wisp of Smoke can mean 2 things to a Charmaster.

- a) Not enough feedstock (Starved)
- b) Too much feedstock (Smothered)

During operation the Moxham runs smokeless and will remain smokeless for the duration providing the Charmaster (Operator) is paying attention. A thin wisp of blue / grey smoke will appear once the wood in the Moxham starts to go to ash. This means there is not enough volatiles left to maintain the flames and the wood is being allowed to burn. Simple add more wood covering the ashing part of the fire in a slow and controlled manner. On the other end of the scale you will see this thing wisp of blue / grey smoke as you come close to smothering the flames use it as an indicator of how much wood to add at any time.

At first glance at the Moxham the viewer may wonder where all the high tech anti-pollution equipment is. Where are all the computerised control gadgets? and the big one; It's just a pipe, this is too simple it can't work!

Every person who has ever run one of these Moxham's has the same reactions. My friends, the true genius in this system comes from the Operator and not any machine.

6 Extinguishing

Less is best.

I signed up for the Rural Fire Service partly so I could better understand fire and the putting out of charcoal.

What I learnt was taking the heat away was far more effective than trying to quench it solely with water.

So use a watering can to put out the remaining flames if you're shutting down early. Tip the Moxham over and hoe the char away from the pile to allow the char to cool rapidly.



7 The Charmasters Secrets of better everything

When it comes to healing the planet there should be no secrets.

If there is the person keeping the secrets needs to be healed.

1. From Japanese biochar making I have learnt that the best time to make quality biochar is in the half of the lunar month that is ten days before and ten days after a full moon.
2. The best char for all round utility is made around 600 degrees C.
3. By soaking the char in high heat for longer periods (The Moxham does this by default) you remove all the nasties and create a stable environment for microbes.
4. By quenching char 2 things happen steam forces some bigger pores and early meeting with water prevents a hydrophobic Biochar.
5. By slowly adding the feedstock to the Moxham you can monitor pollution levels via vision.

6. You can use you char in 2 distinct ways. Dry to remove toxins or conditioned to slow release goodness. Always explain the difference.
7. Biochar is the base on which all mineral interactions can be experimented with. Do not allow one person's way of thinking put the blinkers on your research. No one is an expert.
8. By leaving your Biochar out in the environment for longer periods you increase its Cation exchange capacity (CEC) through its absorption of oxygen. (This means it can suck more / harder / longer etc.)
9. Biology is the missing key. Biology can turn a combination of plentiful minerals into the mineral your lacking so learn the 5 must do's for biology.



8 Biochar Industries Concept

Geoff Moxham wanted everyone on earth to make biochar and help repair the environment. We still carry Geoff's dream along with our own.



Biochar Industries is a community organisation that provides much needed biochar for the local community and cleaning and thinning local neglected plantation forests.

Our plan for 2014 is to create a group of franchised like local operations and pool our resources through the website biocharindustries.com so we can provide as local as possible biochar without the carbon miles.

If you're Interested in our bigger plans please email dolph@biocharproject.org

9 Wood stock



For the most efficient use of your time provided you have a way to reduce the size of the wood stock you get. Here are my recommendations.

All wood is dry

I have successfully biocharred an entire load of fresh fallen plantation trees however the time that it took was twice as long as usual and the yield was one quarter of the size due to exhaustion

All wood is reduced to about the size of firewood

Again in the interest of science I have experimented with huge trunks of trees and in time they have reduced to biochar. This is not very efficacious

10 What I have learned from biochar about safety

The Burnie Hertz rule

- Everything is hot
- Water turns into steam and rises quickly BEWARE

Always wear personal protective gear (Shoes are essential)

During the shutdown phase there will be tiny particles of ash through the air

- A dust mask is essential during this part of the burn
- Carbon monoxide could also be present so take care to get some fresh air away from the Moxham.
- Drink plenty of water during the burn as you dehydrate.
- Make sure at all times the path around where you work is clear of obstacles.

Most importantly stay aware at all times, if you need a break take one, have something to eat if you are hungry, most of the time accidents happen when we ignore that little voice inside us that knows what is going to happen next.

Best of luck to you on your Char journey from Charmaster Dolph